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EXAMINER

CIRIC, L

ART UNIT

PAPER NUMBER

3743

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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/660,733

Applicant(s)

Wilson et al.

Examiner

Ljiljana V. Ciric

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on Aug 13, 2001

2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) 1-24 is/are pending in the application.

4a) Of the above, claim(s) 3, 11, and 12 is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) 1, 2, 4-10, and 13-24 is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☒ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on Sep 13, 2000 is/are objected to by the Examiner.

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. _____.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

15) ☒ Notice of References Cited (PTO-892)

18) ☐ Interview Summary (PTO-413) Paper No(s). _____

16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

19) ☐ Notice of Informal Patent Application (PTO-152)

17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____

20) ☐ Other:

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DETAILED ACTION

Election/Restriction

1. Applicant's election of the first species or the embodiment of Figures 2 through 6 **without** traverse, drawn to claims 1, 2, 4 through 10, and 13 through 24, in Paper No. 3 is acknowledged. Contrary to applicant's remarks in Paper No. 3, there are no generic claims in the instant application; while a generic claim must read on each of the species, the fact that a claim does so read is not conclusive that it is generic. See MPEP § 806.04(d).

Claims 3, 11, and 12 are hereby withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to nonelected inventions or species, there being no allowable generic or linking claim.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the following features must be shown or the feature(s) canceled from the claim(s): a longitudinal, central axis of the fluid passageway as cited in claim 2; a longitudinal axis of the passageway as cited in claim 4; and, a fluid supply device as cited in claim 13. No new matter should be entered.

3. The drawings are objected to under 37 CFR 1.83(a) because they fail to show the cooling loops 52 as being initially of a round cross section but compressed at an upper portion 58 and a lower portion 60 so as to flatten make the cross section oval at these ends as best can be

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understood as described in the originally-filed specification [page 14, lines 2-19]. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Correction is required.

4. Applicant is required to submit *a proposed drawing correction* in reply to this Office action.

Specification

5. The abstract of the disclosure is objected to because it contains minor informalities, as follows. In the first sentence of the abstract, “includes” should be replaced with “including”. Immediately preceding “structures” [line 10 of the abstract], “turbulence inducing” should be inserted for improved clarity. Correction is required. See MPEP § 608.01(b).

6. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required, for example: there is no antecedent basis in the specification for the term “a fluid supply device” as cited in claim 13.

Claim Objections

7. Claims 1, 2, 4 through 10, and 13 through 24 are objected to because of the following informalities, for example: “a” should be inserted immediately preceding “turbulence” [claim 1, line 4; claim 22, line 5]; “a” [claim 4, line 2] should be replaced with “an”; “induce” [claim 6, line 3; claim 23, line 4; claim 24, line 3] should be replaced with “induces”; and, the comma (,)

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immediately following “apparatus” [claim 17, line 1] should be deleted. Appropriate correction is required.

Claim Rejections - 35 U.S.C. § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 1, 2, 4 through 10, and 13 through 24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is not clear which particular structure if any corresponds to the limitations “in a manner selected to achieve a predetermined temperature profile along said passageway in material of said part adjacent to said fluid passageway, in response to fluid flow through said fluid passageway” in claim 1 as written, thus rendering indefinite claim 1 and all claims depending therefrom.

Additionally, the aforementioned limitations are not readily comprehensible as written due to idiomatic informalities, rendering the claims even more unclear. Claims 19 and claim 22 each includes similar, similarly unclear limitations, thus rendering indefinite claim 19, claim 22 and all claims depending from claim 22.

With regard to claim 8, it is not clear what is meant by the limitation “includes aluminum silicon carbide” in line 2 of the claim. Is this limitation used to mean that the plate is made of aluminum silicon carbide or merely that it contains a speck of the material? The limitation “said

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tubing includes stainless steel” appearing in claim 10 is similarly unclear, thus rendering the claims indefinite with regard to the scope of protection being sought.

There is insufficient antecedent basis in the claims for the following limitations: “said fluid” [claim 14, line 4]--note that the fluid was previously only functionally, and not positively, recited; “said temperature profile” [claim 16, line 2]--again, note that the temperature profile was previously only functionally, and not positively, recited.

The limitation “further comprising a phased array antenna system which includes said part, said structure, and said electronic components” as cited in claim 15 is not clear as written and renders the claim indefinite. Which structure if any in addition to the part, the structure, and the electronic components does the phased array antenna system include? If no additional structure is included thereby, then are these previously cited elements (the part, the structure, and the electronic components) cited again in duplicate?

The term “approximately” in claim 16 is a relative term which renders the claim indefinite. The term “approximately” is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Thus, the limitation “approximately isothermal” as used to describe the temperature profile in claim 16 renders the temperature profile indeterminate.

With regard to claim 17, it is not clear whether the term “therein” appearing in line 3 of the claim refers to the flat plate or to the apparatus, thereby rendering indefinite claim 17 and

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claims 18 through 21 depending therefrom. Recommend replacing the term “therein” with a direct recitation of the element referred to by this term.

The limitations “longitudinal distances between adjacent structures *vary along said passageway*” [claim 18, lines 3-5] are unclear as written, thus rendering claim 18 indefinite with regard to the scope of protection sought. First of all, it is not clear whether or not the limitation “adjacent structures” refers to the previously cited plurality of turbulence inducing structures. Second of all, it is not clear whether the limitation “vary along said passageway” is used to mean, for example, that, at different points along the passageway, the longitudinal distances are different in length, or to mean that the distances vary in length over time. Claim 5 contains the limitation “longitudinal distances between adjacent said portions vary along said passageway” and is similarly deficient.

The term “inward” in claim 20 is a relative term which renders the claim indefinite. The term “inward” is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Thus, as used to describe the annular protrusion, this term (which is not defined in terms of a reference parameter) renders the location of the protrusion indeterminate and claim 20 indefinite.

The limitation “along material of a thermally conductive part adjacent a fluid passageway formed within said part” [claim 22, lines 2-4] is not clear as written, rendering indefinite claim 22 and claims 23 and 24 depending therefrom.

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The limitation "which each induce turbulence" [claim 23, line 4] renders claim 23 indefinite because it is not clear to which previously recited element(s) the term "which" refers. Recommend replacing with a direct recitation of the element(s) referred to thereby. Each of claims 5, 6, and 24 contains the same limitation, thus rendering indefinite these claims and any claims depending therefrom.

The above is an indicative, but not necessarily an exhaustive, list of 35 U.S.C. 112, second paragraph, problems. Applicant is therefore advised to carefully review all of the claims for additional problems. Correction is required of all of the 35 U.S.C. 112, second paragraph problems, whether or not these were particularly pointed out above.

Claim Rejections - 35 U.S.C. § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371© of this title before the invention thereof by the applicant for patent.

11. As best can be understood in view of the indefiniteness of the claims, claims 1, 2, 17, and 19 are rejected under 35 U.S.C. 102(e) as being anticipated by *Schubert et al.* (filed on October 15, 1999; division of application filed on October 24, 1996).

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Schubert et al. [especially Figures 8a and 10b] discloses the invention essentially as claimed, including foils or flat plates 1 and 2, and a plurality of turbulence inducing structures or pins 15 disposed along fluid passageways 1a and 1b, respectively. The foil material is inherently thermally conductive, at least to some degree.

The reference thus reads on the claims.

12. Alternately for claims 1, 2, 17, and 19, and as best can be understood in view of the indefiniteness of the claims, claims 1, 2, 5 through 7, 17 through 19, and 21 through 24 are rejected under 35 U.S.C. 102(b) as being anticipated by *Staskus et al.*

Staskus et al. discloses the invention essentially as claimed, including a turbulence inducing structure including protrusions or baffles 34, a first plate or cold plate 14, and a plurality of electronic devices 50 coupled to the plate 14.

The reference thus reads on the claims.

13. Alternately for claims 1, 2, 17, 19, 20, and 22, and as best can be understood in view of the indefiniteness of the claims, claims 1, 2, 4, 17, 19, 20, and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by *Smith*.

Smith discloses the invention essentially as claimed, including a thermally conductive flat plate having a fluid passageway formed within the plate, the turbulence inducing structures each including an annular inward protrusion.

The reference thus reads on the claims.

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14. Alternately for claims 1, 2, 4, 7, 17, 19, 20, and 22, and as best can be understood in view of the indefiniteness of the claims, claims 1, 2, 4, 7, 9, 13, 17, 19, 20, and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by *VEB Inducal*.

VEB Inducal [especially Figure 2] discloses the invention essentially as claimed, including a thermally conductive flat or cold plate 2b having a fluid passageway or channel 3 formed within the plate, and also including a turbulence inducing structure 2c and inwardly projecting annular protrusion 1a, tubing 1 at least partially imbedded within the cold plate 2b.

The reference thus reads on the claims.

15. Alternately for claims 1, 2, 7, 17, 19, and 22, and as best can be understood in view of the indefiniteness of the claims, claims 1, 2, 7, 8, 17, 19, and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by *Clyde*.

Clyde [especially Figures 3, 4, and 6] discloses the invention essentially as claimed, including a thermally conductive part or plate or cold plate 84 or 86 or 214 having a fluid passageway formed in between high areas such as 96 and low areas such as 98, with the high areas such as 96 comprising protrusions extending from a surface of the fluid passageway. The cold plate or part is made of silicon carbide or a similar ceramic material.

The reference thus reads on the claims.

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Claim Rejections - 35 U.S.C. § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. Alternately for claim 21 and as best can be understood in view of the indefiniteness of the claims, claims 10, 14, 16, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over *VEB Inducal*.

As noted in greater detail above, *VEB Inducal* discloses a cooling apparatus essentially as claimed, including that the inventive device is a fluid cooled heat sink for a semiconductor device and that tubing 1 is made from a metallic material.

While *VEB Inducal* does not specifically disclose that tubing 1 includes stainless steel, for example, Official Notice is hereby taken by the examiner that stainless steel is used in heat exchanger tubing disposed in cooled heat sinks, for example. While *VEB Inducal* does disclose that the inventive device is to be used for cooling a semiconductor device and does furthermore suggest or imply that the semiconductor device to be cooled is to be thermally coupled with plate 2b, *VEB Inducal* does not specify that a plurality of electronic components are thermally coupled with the thermally conductive part or plate 2b. Nevertheless, it is not inventive to merely multiply or increase the number of electronic components which are thermally coupled with the plate 2b.

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It would thus have been obvious to one skilled in the art at the time of the invention to modify the semiconductor cooling device of *VEB Inducal* by specifically having tubing 1 be made of either stainless steel or an alloy in order to simultaneously ensure high thermal conductance and durability of the tubing while keeping both manufacturing and maintenance costs relatively low. It would also have been obvious to one skilled in the art at the time of the invention to modify the semiconductor cooling device of *VEB Inducal* by merely increasing the number of electronic components which are thermally coupled to the cooling device in order to effectively and maximally utilize the cooling capability of the device, for example.

18. The non-application of art against claim 15 should not be construed as an indication that the claim contains allowable subject matter but rather that the claim could not be examined on the merits due to indefiniteness.

Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. *Chu et al.* and *Hou* each discloses a cold plate cooling system. *Sherwood*, *Pellant et al.*, *Block et al.*, *Iversen*, *Romero et al.* ('269), *Lavochkin*, *Romero et al.* ('463), *Tsuji et al.* (filed March 10, 1999), *Wargo* (filed March 28, 2000), and *Fitzgerald et al.* (filed April 28, 2000) each discloses a cooling device for electronic elements, wherein the cooling is enhanced using induced turbulence. *Galyon et al.* and *Siemens-Schuckertwerke Aktiengesellschaft* each discloses an electronic cooling device with embedded coolant flow tubing. *Drefahl et al.*, *Albrecht*, *Lu et al.*,

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Houglund et al., *Ooba et al.*, *Wunning*, *Ludwig et al.*, and *Randlett et al.* each shows heat exchanger tubes or passages equipped with turbulence-inducing structures.

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ljiljana (Lil) V. Ciric, whose telephone number is (703) 308-3925.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ira Lazarus, can be reached on (703) 308-1935. The fax phone number is (703) 305-3463.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0861.


LJILJANA CIRIC
PATENT EXAMINER

lvc

October 19, 2001